

RFI/RI/BRA Format

EXECUTIVE SUMMARY

The purpose of the Executive Summary is to provide the results in a very concise overview manner for the reader who does not wish to be weighed down by the details of the analyses. The Executive Summary will support the key decisions agreed to by the Core Team during the development of the RI/BRA report, and will prepare the Core Team for validating key conclusions. The Executive Summary will be consistent with the RI/BRA scoping summary.

The following sections should be summarized in the Executive Summary:

Background
RFI / RI Investigation (Conceptual Site Model)
Nature and Extent
Fate and Transport
Risk Assessment
RGOs

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GENERAL NOTE: When a protocol is used, refer to it by title, revision number, and date. Figures and Tables are to be grouped together and placed at the back of each chapter, unless otherwise noted.

CHAPTER 1. INTRODUCTION

The purpose of following sections is to provide the reader with a discussion of the purpose and layout of the document and to provide the reader with basic information about the unit.

1.1 Report Organization

Provides a description of the report organization for the reader.

1.2 Regulatory Background

1.2.1 RCRA Facility Investigation Program

Provides a description of the RCRA status of the unit, if applicable. This section is not needed for a CERCLA only unit.

1.2.2 CERCLA Remedial Investigation Program

Provides a description of the CERCLA status of the unit.

1.2.3 Natural Resource Injury Evaluation

This section provides a discussion of potential natural resource injuries that are suspected or known. The potential injuries are documented by completion of the Natural Resource Injury Checklist. Natural resource injury evaluations are based on the SRS Natural Resource Trustee Responsibilities list of trust resources.

Each of the following should be discussed, as appropriate:

- Surface water resources*
- Groundwater resources*
- Air resources*
- Geological resources*
- Biological resources*

1.3 Unit Description

Provides a description of the unit history, location, and setting. This information is available from the workplan and updated, as necessary. Appropriate maps showing the unit will be included.

1.4 RFI/RI/BRA Protocol Implementation

Discusses the fact that the document was prepared according to a set of agreed upon protocols and refers the reader to the appendix containing the list of protocols used.

CHAPTER 2. CONCEPTUAL SITE MODEL AND STUDY AREA INVESTIGATION

The purpose of following sections is to provide the reader with a discussion of the conceptual site model (CSM) for the unit. This includes a discussion of the known and suspected sources of contamination, identification of those sources, the types of contaminants and potentially affected media, the known and potential routes of migration, and the known or potential human and ecological receptors. The CSM and unit investigation will be consistent with the key decisions agreed to by the Core Team at the Post Characterization RI/BRA Scoping Meeting prior to the implementation of RFI/RI/BRA protocols.

2.1 Conceptual Site Model

Provides a discussion of the waste unit as represented by the CSM. Specifically identifies all sources, exposure routes, and media applicable to the exposure unit.

- 2.1.1 Primary Sources of Contamination**
- 2.1.2 Primary Sources Environmental Release Mechanisms**
- 2.1.3 Secondary Sources of Contamination**
- 2.1.4 Secondary Sources Environmental Release Mechanisms**
- 2.1.5 Exposure Media**
- 2.1.6 Exposure Routes**
- 2.1.7 Receptors (Human and Ecological)**

2.2 Investigation Objectives

Provides a discussion of the objectives of the investigation as it is addressed by the CSM. This will include a summary of the objectives identified through the use of the DQO process evaluations as detailed in the workplan. Based on the results of the investigation, a revised CSM may be presented.

2.3 Unit Assessment Investigation

Provides a detailed description of the unit-specific assessment investigation activities. The following subsections will include information about the number of samples and the type of sampling and analysis conducted to characterize CSM sources and exposure media. The information in the subsections will also describe unit assessment activities per appropriate exposure units.

2.3.1 Background Investigation

Provides a discussion of the unit-specific background investigation activities that were conducted in order to establish baseline concentrations for the evaluation of unit contaminant information. Information and data from the background investigation will be presented, as needed, by specific exposure groups to accommodate the CSM and the DQO process.

2.3.2 Primary Source Investigation

Provides a discussion of the unit-specific investigation activities conducted in order to characterize the primary source(s) of contamination as identified by the CSM and the DQO process.

2.3.3 Secondary Source Investigation

Provides a discussion of the unit-specific investigation activities conducted in order to characterize the secondary source(s) of contamination as identified by the CSM and the DQO process.

2.3.4 Exposure Media Investigations

Provides a discussion of the specific investigation activities conducted in order to characterize exposure media as identified by the CSM and the DQO process. This section will include, as appropriate, a discussion of all potentially contaminated exposure media, including soil, groundwater, surface water, sediments, biota, and air. It will not duplicate any discussions presented in the source investigation sections.

2.3.5 Physical Characteristics Investigation

Provides a discussion of the specific investigation activities conducted in order to obtain physical (geotechnical) parameters that were used to accommodate the physical data needs of the CSM.

2.3.6 Receptors (Human and Ecological)

Provides a discussion of the specific investigation activities conducted and reasoning applied in order to determine the receptors that were selected to be used in the CSM.

CHAPTER 3. PHYSICAL CHARACTERIZATION OF STUDY AREA

The purpose of the following sections is to provide the reader with a discussion of the physical attributes of the waste unit as well as a discussion relating the unit to the regional physical framework. Historical data and the data results from the unit assessment activities to ascertain physical characteristics investigation activities are presented in the appropriate subsection for which the activity was conducted. For example, geologic data gathered via cone penetrometer technology and/or coring operations will be utilized to augment the Unit Specific Geology subsection.

3.1 Surface Features

Provides a description of the setting of the waste unit with respect to surface features (e.g., topography).

3.2 Meteorology

Provides a description of the typical weather conditions for the waste unit. A reference to existing sources that summarize SRS weather conditions can be used instead of a detailed discussion.

3.3 Surface Water Hydrology

Provides a description of the surface water hydrologic characteristics for the waste unit including wetlands, streams, etc. This section is to include a figure depicting the waste unit in its respective integrator/watershed operable unit along with any other waste units identified in the watershed. All of the known groundwater plumes within the study area will be included on the map.

3.4 Unit Soils

Provides a description of the soil characteristics associated with the waste unit that has been investigated.

3.5 Geology

3.5.1 Regional Geology

Provides a reference to the workplan (or appropriate Administrative Record source) for regional geology description, unless revised based on investigation.

3.5.2 Unit-Specific Geology

Provides a brief description of the unit-specific geology. This section is to include historical data as well as data obtained during investigation.

3.6 Hydrogeology

3.6.1 Regional Hydrogeology

Provides a reference to the workplan (or appropriate Administrative Record source) for regional hydrogeology description, unless revised based on investigation.

3.6.2 Unit-Specific Hydrogeology

Provides a description of the unit-specific hydrogeology. This section is to include historical data as well as data obtained during investigation.

3.7 Demography and Land Use

3.7.1 Demographics

Provides a reference to an appropriate source of information in the Administrative Record or a discussion of the appropriate data.

3.7.2 Land Use

Provides a description of the proposed/accepted land use for the area occupied by the waste unit. Include figures as needed.

CHAPTER 4. NATURE AND EXTENT OF CONTAMINATION

The purpose of the following sections is to provide the reader with a discussion of the results of the unit investigation. This is best achieved using tables, illustrations, and interpretive discussion of the type and extent of contamination for all environmental media that are present as a result of the operable unit. Both the horizontal and vertical extent of contamination are to be discussed.

Based on professional judgment, prepare planar maps, cross-sectional plots, or other illustrations for each USC in each exposure group, which will be useful in illustrating the nature and extent of contamination at the unit. It is expected that data for all preliminary COCs will be interpreted. In addition to plotting and/or tabulating contaminant data, other data will also be provided (i.e., non-detects, not analyzed, less than detection limit, etc.).

Contouring of concentration isopleths will be provided when appropriate. The inability to contour will also be explained (e.g., constituent ubiquitous throughout the unit, lack of data, etc.). The nature and extent of contamination summary and conclusions will provide the method of managing uncertainty where interpretation is not possible based on inadequate data quality or quantity. The conclusions of the nature and extent evaluation will be consistent with the key decisions agreed to by the Core Team at the Post Characterization RI/BRA Scoping Meeting.

4.1 Overview of Sampling and Analysis Plan

This section provides an overview of the sampling and analysis plan, which was executed, for the unit.

4.2 Unit-Source Data Presentation

Provides a presentation and interpretation of the data collected during the investigation along with appropriate process history and existing data in order to depict the nature and extent of contamination for the media at the waste unit.

At a minimum, all preliminary COCs will be illustrated in a planar and vertical manner. Based on best professional judgment, other constituents/parameters that will aid in the interpretation of the operable unit in terms of the CSM will also be illustrated, as needed.

Follow Unit-Source Data Processing Protocol, latest revision.

Primary Source(s)

Secondary Source(s) / Exposure Media

Soils (0 to 1 ft)

Soils (0 to 4 ft) [if applicable]

Soils (0 to X ft) [where X represents the deepest level in the vadose zone
which was investigated]

Sediments (if applicable)

Surface Water (if applicable)

Aquifer(s) (if applicable)

Biota (if applicable)

4.3 Unit-Background Data Presentation

Provides a presentation and interpretation of the data collected during the investigation along with appropriate process history and existing data in order to depict background concentrations in the media at the waste unit. Presentation (e.g., maps and cross-sections) of unit-background data may best be provided along with unit-source data. . Follow Unit-Background Data Processing Protocol, latest revision.

Soils (0 to 1 ft)

Soils (0 to 4 ft) [if applicable]

Soils (0 to X ft) [where X represents the deepest level in the vadose zone
which was investigated]

Sediments (if applicable)

Surface Water (if applicable)

Aquifer(s) (if applicable)

Biota (if applicable)

4.4 Unit-Specific Constituents (USC) Determination

Provides documentation of the determination of USCs. Follow USCs Protocol, latest revision.

4.5 Preliminary Applicable or Relevant and Appropriate Requirements (ARAR) COCs

Provides documentation of the constituents that exceed ARARs. ARAR COCs Protocol, latest revision for preliminary ARAR COC determination.

4.6 Nature and Extent of COCs

Provides a discussion of the nature and extent of contamination limited to those USCs that are identified as COCs in the chapters of the document that address ARARs, fate and transport, and human health and ecological risk assessments.

4.7 Principal Threat Source Material (PTSM) Evaluation

Provides a discussion of the operable unit source(s) that may pose a threat to human health or the environment if left unaddressed.

4.7.1 PTSM Description

Provides a definition of PTSM and low level threat source material (LLTSM) and explains the criteria used to identify potential source material as PTSM or LLTSM. Also includes a discussion of the future land use for the operable unit.

4.7.2 PTSM Evaluation Process

Provides a discussion of the process used to evaluate the operable unit for determination of PTSM and a discussion of the data evaluated. Tables are provided for the toxicity and mobility evaluations.

4.7.2.1 PTSM Toxicity Aspect

Provides a discussion of the toxicity screen used to evaluate the operable unit for PTSM. Includes a discussion of the constituents that exceed the toxicity threshold.

4.7.2.2 PTSM Mobility Aspect

Provides a discussion of the contaminant migration analysis to determine if the media evaluated meet the mobility criteria for PTSM.

4.8 Nature and Extent Uncertainty Analysis

Provides a discussion focusing on the uncertainty associated with the nature and extent of contamination and includes a recommendation of how to manage this uncertainty. The adequacy of the operable unit-specific data set's quality and quantity will be evaluated. Contamination detected in method blanks, analytical interference, counting error, sample acquisition anomalies, measurement anomalies, etc., if significant and appropriate will be discussed and the ramifications upon the data provided.

CHAPTER 5. SCREENING AND EXPOSURE POINT CONCENTRATIONS

The purpose of the following sections is to provide the reader with a tabular list of the screening and exposure point concentrations (EPC) for contaminants at the unit. This information will be used in the technical analyses (fate & transport, human health risk, ecological risk) performed in the following chapters. Note that some screening (for USCs and ARAR COPCs) has already been performed and discussed in the previous chapter. Selected exposure groups and receptors will be consistent with the key decisions agreed to by the Core Team at the Post Characterization RI/BRA Scoping Meeting.

5.1 Unit-Source Exposure Group Exposure Point Concentrations

Tabular presentation of the needed information. Follow Unit-Source Data Processing Protocol, latest revision.

5.2 Unit-Background Exposure Group Exposure Point Concentrations

Tabular presentation of the needed information. Follow Unit-Background Data Processing, latest revision.

5.3 Uncertainty Discussion

Provides a discussion focusing on uncertainty associated with the determination of the exposure point concentration.

CHAPTER 6. CONTAMINANT FATE AND TRANSPORT

The purpose of this chapter is to provide the reader with a discussion of the expected fate of the unit contaminants in the soil and groundwater. The analysis of the contaminant migration through the soil to groundwater is described in detail within this chapter with the end result being a list of preliminary contaminant migration constituents of concern (CMCOCs). For groundwater contaminants that have exceeded the MCLs and for which groundwater modeling has been determined to be appropriate a summary discussion of the groundwater modeling is provided in this Chapter. A separate appendix documenting the details of the groundwater modeling will be provided. Results of the contaminant fate and transport analysis and final CMCOCs will be discussed with the Core Team at the Problem ID Scoping Meeting.

6.0 Introduction

This section describes the types of contaminant migration analyses and the rationale for providing those analyses. For example the soil USCs identified in Chapter 4 are analyzed using the contaminant migration analysis protocols for their potential to pose a threat to groundwater contamination in the future. Documentation of this analysis is provided in this Chapter. Constituents that were shown in Chapter 4 to constitute a discernable plume at concentrations above the MCL are considered for groundwater modeling. A summarization of the groundwater modeling is provided in this chapter, while the detailed documentation of the modeling effort is provided in an appendix to the RFI/RI/BRA.

6.1 Physical and Chemical Properties of Contaminants

The USCs and groundwater contaminants exceeding MCLs shall be identified by the general contaminant class (e.g. metals, VOCs, radionuclides, etc.). Provide the justification for including or not including groundwater constituents that exceed an MCL in the groundwater modeling. Physical and chemical properties that control the behavior of the appropriate contaminant classes in the environment shall be discussed. This will include a narrative discussion of the general mobility of the contaminant class within the environment as well as the pertinent physical constants affecting contaminant transport such as K_{oc} , K_{ow} , TOC, K_{ds} , half-lives, solubility, density, vapor pressure, Henry's Law and constants.

6.2 Fate and Transport of Soil USCs

6.2.1 Vadose Zone Conceptual Site Model

Provides a discussion of the potential sources of contamination, migration pathways, release mechanisms, and receptor locations. Significant findings of the RI that would affect migration of contaminants (e.g. the presence of NAPLs) should be discussed. In addition, a discussion of the generic factors affecting contaminant migration should be included. The logic of analyzing the contamination migration potential using either combined units or individual units will be presented.

6.2.2 Soil Leachability Screening

In this section the contaminant migration constituents of potential concern (CM COPCs) are determined using the computer spreadsheet, VZCOMML. Follow CM COPCs Protocol, latest revision.

6.2.3 Modeling (If used for analysis in the report)

Provides a discussion of the modeling used to derive the Tier 2 CM COPCs (using VZCOMML) and the detailed unit-specific fate and transport model(s) for the vadose zone to be developed for any resulting CM COPCs.

6.2.3.1 Model Input Data and Assumptions

Provides a discussion of the rationale for the selection of K_d s, exposure pathways, geotechnical parameters, and other assumptions and the model's sensitivity to them.

6.2.3.2 Model Application

Provides a discussion of the methods utilized in the unit-specific model.

6.2.3.3 Model Results

Provides a discussion of the results of the unit-specific modeling.

6.2.4 Identification of Preliminary Contaminant Migration COCs

In this section, the preliminary contaminant migration constituents of concern (CM COCs) are determined based on the results obtained from the modeling. Apply the CM COCs Protocol, latest revision in order to determine which constituents are to be identified.

6.2.5 Soil Contaminant Migration Analysis Uncertainty Discussion

Provides a discussion of the uncertainty inherently associated with the contaminant migration analysis.

6.3 Fate and Transport of Groundwater Contaminants

Information provided in this section is supplied by the executive summary of the corresponding groundwater modeling report.

6.3.1 Hydrogeologic Conceptual Model

The Hydrogeologic Conceptual Model (HCM) is a simplified presentation of the groundwater flow system used to simplify the field problem. This section includes summary information regarding descriptions of the geologic setting, hydrostratigraphic units, hydraulic parameters, and system boundaries such as external boundaries, wells, and sources/sinks. Also, a description of the source and geometry of contaminant plumes is included. A figure of the HCM is required for Chapter 6.

6.3.2 Summary of Flow Modeling

In this section, the major assumptions, input parameters, and result that were used in the flow model are discussed. Also, a brief description of the data points used for calibration targets and the results of, the overall calibration are included. A comparison of the calculated head distribution with head distribution figures presented in earlier chapters of the RFI/RI/BRA (most likely Chapter 3) shall be made with any discrepancies explained. A figure(s) of predicted hydraulic head for each aquifer unit modeled will be presented with Chapter 6 figures.

6.3.3 Summary of Particle Tracking (if applicable)

Describe the rationale for performing particle tracking (e.g. to evaluate

potential monitoring well placement, to evaluate potential source terms, etc.) . Provide a summary of the seed locations and results from forward and backward particle tracking in this section.

6.3.4. Summary of Contaminant Transport Modeling (if applicable)

Identify the model used to estimate contaminant transport. Include a summary of the transport mechanisms modeled (e.g. advection, dispersion, biodegradation, decay, etc.). List the significant assumptions used in for the modeling, discuss model calibration, and summarize the conclusions in the report. Figures depicting the hydrogeologic conceptual model, predicted hydraulic head(for each aquifer zone), and the contaminant plume configuration will be included for appropriate time intervals.

6.3.5 Uncertainty Discussion

Provide a discussion of uncertainty resulting from the deviation between model predictions due to incomplete knowledge about head distribution, aquifer parameters, source term conditions, and hydrologic stresses. The categories (sources) of uncertainty that should be discussed include:

- 1) Conceptual uncertainty – unsure of the processes occurring*
- 2) Model uncertainty - using a simplified representation of reality*
- 3) Parameter uncertainty – unsure of parameter values used in the model (assessed during calibration sensitivity analysis)*

In addition, the significance of the uncertainty should be explained with respect to the remedial action objectives of the OU.

CHAPTER 7. HUMAN HEALTH BASELINE RISK ASSESSMENT

The purpose of this chapter is to provide documentation of the analysis of the potential for adverse human health effects associated with exposure to contaminants likely to be present at the unit. Baseline human health risks are those risks to human health that can be anticipated to be present in the absence of any remedial efforts or institutional controls for the unit. Exposure groups and receptors evaluated will be consistent with the key decisions agreed to by the Core Team at the Post Characterization Scoping Meeting prior to the implementation of RFI/RI/BRA protocols. Results of the risk assessment will be presented to the Core Team at the Problem ID Scoping Meeting

For the detailed human health risk assessment format, refer to the Environmental Restoration Division Regulatory Handbook, Manual ERD-AG-003, Part I, RCRA/CERCLA Document Format, F-16 Human Health Risk Assessment Template.

7.1 Description of the Human Health Risk Assessment Process

7.1.1 Overview

Provides a brief explanation of the purpose of the BRA and discusses the organization of the human health BRA chapter. Provides an introductory discussion of the fundamental concepts pertinent to the human health risk assessment process.

7.1.2 Receptors and Exposure Scenarios

Identifies the receptors and exposure scenarios, which will be evaluated in the assessment. The risk assessment evaluates both known and hypothetical land uses. At a minimum, includes the following based on the Human Health Receptors and Scenarios Protocol, latest revision:

- *Known On-Unit SRS Worker*
- *Hypothetical On-Unit Industrial Worker*
- *Hypothetical On-Unit Resident (Adult/Child)*

Exposure Parameters for these scenarios are based on Human Health Exposure Parameters Protocols, latest revisions.

7.1.3 Exposure Routes

Identifies the exposure routes which are applicable and includes the following:

*Ingestion (of soil, water, etc.)
Inhalation (of particles and vapors)
Dermal exposure
External Radiation*

These are discussed in detail in the Human Health Receptors and Scenarios Protocol, latest revision.

7.1.4 Exposure Groups

Provides a discussion of how the data will be grouped and used. In the risk assessment, consideration will be given to a variety of receptor/media/route combinations. Exposure groups (EGs) will be identified, which will be used to represent exposure, point concentrations in the risk assessment. It is important to note that EGs are developed for each unit under investigation and are tailored to the needs of the risk assessment for that unit. Additional EGs may be developed, as needed. If an overall exposure unit is to be evaluated, then this section should also include a discussion on the combined data groups.

The following are based on the Development of Exposure Groups Protocol, latest revision. For human health risk assessment purposes, typical exposure groups are the following:

Unit-Source

- *Soil from 0 to 1 foot, over the area of the unit.*
- *Soil from 0 to 4 feet, over the area of the unit (if appropriate).*
- *Groundwater in a designated aquifer system (may be in the highly concentrated area of the plume, if appropriate).*
- *Surface Water in a nearby water system.*
- *Sediments / soils in nearby drainage areas.*

Unit-Background

- *Soil from 0 to 1 foot*
- *Soil from 0 to 4 feet (if appropriate)*

- Soil from 0 to X feet, where X represents the depth of the vadose zone investigated.
- Groundwater in a designated aquifer system.
- Surface Water in a nearby water system.
- Sediments / soils in nearby drainage areas.

7.1.5 Exposure Pathways

Provides a review of the unit CSM and discusses the application for risk assessment. This section includes a discussion of exposure pathways. Based on the Exposure Pathways Protocol, latest revision, an exposure pathway describes the course a contaminant takes from its origin at the source to the exposed individual. It consists of five elements, as follows:

1. source (landfill, spill, etc.);
2. exposure media (groundwater, air, etc.);
3. exposure point (drinking water well, shower, etc.);
4. exposure route (ingestion, inhalation, dermal absorption, etc.); and
5. receptor (resident, worker, etc.).

7.2 Human Health Constituents of Potential Concern

In this section, HH COPCs are selected using the established protocol

7.2.1 COPC Selection Process Description

Provides a discussion of how the human health constituents of potential concern (HH COPC) for the unit are identified for each exposure group and how the COPC process is conducted. This is based on the Human Health Constituents of Potential Concern Protocol, latest revision.

7.2.2 COPC Screening Results for Unit-Source Data

Refers to the results in the tables containing the HH COPC screening process.

7.2.3 COPC Screening Results for Unit-Background Data

Refers to the tables containing the results of the HH COPC screening process.

7.2.4 COPC Screening Results Summary

Refers to the summary tables containing the results of the HH COPC screening process.

7.3 Exposure Assessment

Provides a description of the type and magnitude of the potential human exposures to COPCs. For a given receptor group, this result is an estimate of chronic daily intake or dose that may occur from exposure to the COPCs in the various environmental media within each exposure group.

7.3.1 Exposure Point Concentrations

Refers back to the tables in Chapter 5 and the RME concentrations, which were determined for each exposure group.

7.3.2 Development of Constituent Intakes

Provides information concerning the equations and exposure factors (i.e., assumptions) used to calculate constituent intakes for both RME exposure parameters and CTE exposure parameters.

7.3.3 Exposure Factors

Describes the exposure factors that are combined with the exposure point concentrations in order to calculate intake or dose.

7.3.4 Exposure Equations

Provides a description of the intake estimates developed for each COPC using corresponding exposure point concentrations. The risk assessment uses intake equations developed and applied in accordance to regulatory risk assessment guidance.

7.4 Toxicity Assessment

The objectives of the toxicity assessment discussion are to evaluate the inherent toxicity of the substances under investigation and to identify and to select toxicity values for use in the risk characterization.

7.4.1 Chemical and Radionuclide Toxicity

Provides a description of the data to be used to characterize the toxicity of the individual constituents for carcinogenicity and for chronic effects.

7.4.2 Lead

The toxicity assessment process used for lead is described.

7.4.3 Provisional Values

The treatment of constituents with provisional values is described.

7.4.4 Constituents for which No EPA Toxicity Values are Available

The toxicity assessment process is complicated by the fact that toxicity values are not readily available for all constituents or all exposure routes. In this section, a discussion of those constituents is presented. This section also includes a discussion of the use of surrogates when available.

7.4.5 Exposure to VOC During Showering

This section discusses the use of the drinking water ingestion intake to estimate intake due to inhalation and dermal contact with VOCs while showering.

7.5 Human Health Risk Estimation

The risk estimate spreadsheets are presented in tabular format in the appendices. The text refers the reader to the appropriate set of appendices.

7.6 Human Health Risk Assessment Results

The results of the risk characterization are presented.

7.6.1 Human Health Summary of Receptor Risks and Hazards

The results of the risk and hazard estimates are presented here.

7.6.2 Human Health Risk Assessment Summary

The total cumulative risk determined for each receptor is presented here.

7.6.3 Human Health Preliminary Constituents of Concern

Provides a listing and discussion of all of the preliminary Constituents of Concern.

7.6.4 Human Health Risk Assessment Uncertainty Discussion

Provides a discussion of the uncertainty that is inherent in the selection of key input parameters and in every step of the risk assessment process. The results of risk assessment may be understood only in light of the assumptions and methods used in the evaluation.

CHAPTER 8. ECOLOGICAL BASELINE RISK ASSESSMENT

This section has been removed. For BRAs see Environmental Restoration Division Regulatory Handbook, Manual ERD-AG-003, Part I, RCRA/CERCLA Document Format, F-14 Ecological Risk Assessment Process Annotated Outline for the ecological risk assessment format. Exposure groups and receptors evaluated will be consistent with the key decisions agreed to by the Core Team at the Post Characterization Scoping Meeting prior to the implementation of RFI/RI/BRA protocols. Results of the risk assessment will be presented to the Core Team at the RI/BRA scoping meeting.

CHAPTER 9. SELECTION OF REFINED CONSTITUENTS OF CONCERN (RCOCs) and REVISED CONCEPTUAL SITE MODEL

The purpose of this chapter is to provide documentation of the review of the refined constituents of concern (RCOCs) identified as a result of the application of characterization, contaminant migration, human health risk, and ecological risk protocols to the unit data in the preceding chapters. The selection of RCOCs and revision of the Conceptual Site Model (CSM) will be based on key conclusions determined by the Core Team during the Problem ID Scoping Meeting.

The purpose of the review is to determine which of these RCOCs are to be rejected as unsuitable for retention for the next phase of the remedial investigation process which involves the development of remedial goal options (RGOs). The review is conducted by examining each set of preliminary COCs - ARAR, Contaminant Migration, Human Health, and Ecological Health. The selection is performed by applying the 'COC Refinement Process' Protocol, latest revision.

9.1 COC RETENTION ANALYSIS

9.1.1 ARAR Based COCs

Provides a discussion of the uncertainty associated with each of the preliminary ARAR COCs. Based on the review of the uncertainties, the discussion finishes with recommendations as to which preliminary COCs should become refined ARAR COCs.

9.1.2 Contaminant Migration Based COCs

Provides a discussion of the uncertainty associated with each of the preliminary CM COCs. Based on the review of the uncertainties, the discussion finishes with recommendations as to which preliminary COCs should become refined CM COCs. This will usually involve referring back to the modeling performed in a previous chapter.

9.1.3 Human Health Based COCs

Provides a discussion of the uncertainty associated with each of the preliminary HH COCs. Based on the review of the uncertainties, the discussion finishes with recommendations as to which refined COCs should become final HH COCs.

9.1.4 Ecologically Based COCs

Provides a discussion of the uncertainty associated with each of the preliminary ECO COCs. Based on the review of the uncertainties, the

discussion finishes with recommendations as to which preliminary COCs should become refined ECO COCs.

9.1.5 Source Material COCs: PTSM COCs and LLTSM COCs

Provides a discussion of the uncertainty associated with the inherent toxicity, physical state, and potential mobility of source material identified as PTSM or LLTSM.

9.2 RCOC LIST

Presentation of the list of refined COCs.

9.3 REVISED CONCEPTUAL SITE MODEL

Presentation and discussion of the revised conceptual site model. The CSM is revised based on the new understanding of the unit, which has been the result of the preceding technical analysis and uncertainty analysis.

CHAPTER 10. DEVELOPMENT OF REMEDIAL GOAL OPTIONS (RGOs)

The purpose of this chapter is to provide documentation on the development of remedial goal options (RGOs). The revised COCs (RCOCs) and RGOs will be based on key conclusions determined by the Core Team during the Problem ID Scoping Meeting.

10.1 Description of Remedial Action Objectives for the Unit

Presents a discussion of the specific objectives for remediation of the unit. The remedial action objectives will be used to determine whether or not RGOs need to be developed for each revised COC.

10.2 Remedial Goal Option Development

10.2.1 ARAR Based RGOs

Provides a detailed discussion of the development of remedial goal options for the purpose of compliance with ARARs. Follow ARAR Remedial Goal Options Protocol, latest revision. . In addition, figures are provided illustrating the locations where each of the preliminary RGOs are presently exceeded at the unit.

10.2.2 Contaminant Migration Based RGOs

Provides a detailed discussion of the development of remedial goal options for protection of groundwater. These options will apply to remediation of the vadose zone soils associated with the unit. Follow Contaminant Migration Remedial Goal Options Protocol, latest revision. . In addition, figures are provided illustrating the locations where each of the preliminary RGOs are presently exceeded at the unit.

10.2.3 Human Health Based RGOs

Provides a detailed discussion of the development of remedial goal options for the protection of human health. These will apply to the various media associated with the unit. Follow Human Health Remedial Goal Options Protocol, latest revision. . In addition, figures are provided illustrating the locations where each of the preliminary RGOs are presently exceeded at the unit.

10.2.4 Ecologically Based RGOs

Provides a detailed discussion of the development of remedial goal options for the protection of ecological receptors in the environment. These will apply to the various media associated with the unit. In addition, figures are provided illustrating the locations where each of the preliminary RGOs are presently exceeded at the unit.

10.2.5 Most Restrictive RGOs for each Media

Provides a tabular listing, by media, of the preliminary RGOs based on ARARs, as well as contaminant migration, human health, and ecological analysis. Average background values for each media are included. From this table, the final RGO(s) for each media are determined based on the lowest RGO derived from the ARAR, contaminant migration, human health, and ecological RGO.

CHAPTER 11. SUMMARY OF RESULTS

The purpose of the Summary chapter is to provide the results in a relatively concise manner consistent with the RI/BRA scoping summary. This will assist the reader who wishes to have a detailed understanding of the results of the assessment but does not wish to review all of the details of the characterization, contaminant migration, human health risk, and ecological risk analyses. Summary information provided in this section will support key decisions agreed to by the Core Team during the Problem ID Scoping Meeting.

11.1 RFI/RI/BRA Process

Provides a summary discussion of the RI/BRA process and brief explanation and result from each chapter.

11.2 Primary Source Investigation Results

Provide a summary discussion of the major findings of the primary source investigation. Refers to the presentation and interpretation of the results from earlier chapters of the document, rather than repeating them here.

11.3 Secondary Sources Investigation Results

Provide a summary discussion of the major findings of the secondary source(s) investigation. Refers to the presentation and interpretation of the results from earlier chapters of the document, rather than repeating them here. Each relevant media will be discussed -

*soils - 0 to 1 ft, 0 to 4 ft, 0 to X ft [where X
represents the deepest level in the vadose
zone which was investigated]*

sediments

surface water

aquifer(s)

biota (if available)

air (if available)

11.4 Natural Resource Injury Evaluation Results

This section provides a discussion of potential natural resource injuries that are suspected or known.

11.5 Applicable or Relevant and Appropriate Requirement (ARAR) Technical Analysis Results

Provides a summary discussion of the major findings from the ARAR analysis. Refers to the presentation and interpretation of the results from earlier chapters of the document. Includes the results of the uncertainty assessment and a list of the refined ARAR COCs.

11.6 Principal Threat Source Material Technical Analysis Results

Provides a summary discussion of the major findings from the PTSM analysis. Refers to the presentation and interpretation of the results from earlier chapters of the document.

11.7 Contaminant Migration Technical Analysis Results

Provide a summary discussion of the major findings of the contaminant migration analysis. Refers to the presentation and interpretation of the results from earlier chapters of the document. Includes the results of the uncertainty assessment and a list of the refined CM COCs.

11.8 Human Health Risk Assessment Results

Presents a summary of the results of the human health risk assessment. Refers to the detailed analysis from earlier chapters and the appendices. Includes the results of the uncertainty assessment and a list of the refined HH COCs.

11.9 Ecological Risk Assessment Results

Presents a summary of the results of the ecological risk assessment. Refers to the detailed analysis from earlier chapters and the appendices. Includes the results of the uncertainty assessment and a list of the refined ECO COCs.

11.10 Most Likely RGOs for Each Media

Provides a tabular listing, by media, of the most likely RGOs with consideration for ARARs, contaminant migration, human health, and ecological analysis, and background values. The most likely RGOs will consider the land use and likely response actions as determined by the Core Team and may differ from the most restrictive RGOs presented in Chapter 10.

11.11 Conclusion

The purpose of this section is to provide a final succinct conclusion representative of key decisions agreed to by the Core Team during the Problem ID scoping meeting. The conclusion section will summarize the problems warranting actions, remedial action objectives, and uncertainties by subunit as presented in the operable unit scoping summary document. The intent of this section is to summarize the conclusions of the scoping summary document in support of the operable unit strategy.

11.11.1 Problem Warranting Action

Presents the problem statement by subunit as presented in the operable unit scoping summary.

11.11.2 Remedial Action Objectives

Presents the RAOs defined specifically for the problem to which they apply. The RAOs will be presented by subunit and specify the exposure pathway to be mitigated and the receptor to be protected.

11.11.3 Uncertainties

Presents the key uncertainties specific to the remedial decisions identified for each subunit.

11.12 Operable Unit Strategy

Identifies key management strategies related to achieving overall operable unit remediation. Key components of the strategy warranting discussion may include the identification of early actions, integration with other operable units, segregation of operable unit components, and modifications to project schedules and milestones based on changes in technical understanding.

CHAPTER 12. BIBLIOGRAPHY

APPENDICES

APPENDIX	CONTENT
A	Protocol Matrix
B	Reserved for additional Nature and Extent Drawings, if needed
C	Data Summary Report
D	Reserved for use, if needed
E	Contaminant Migration Modeling (if performed)
F	Toxicological Profiles
G	Reserved for use, if needed
H	Human Health Risk Calculations - Non-Cancer Hazard, RME
I	Human Health Risk Calculations - Cancer Risk, RME
J	Human Health Risk Calculations – Radionuclide Dose, RME
K	Human Health Risk Calculations - Non-Cancer Hazard, CT
L	Human Health Risk Calculations - Cancer Risk, CT
M	Human Health Risk Calculations - Radionuclide Dose, CT
N	Lead Modeling
O	Ecological Risk Calculations
P	RGO Calculations - Contaminant Migration
Q	RGO Calculations - Human Health Risk
R	RGO Calculations - Ecological Risk
S	Natural Resources Injury Evaluation

ATTACHMENT 1 FIGURES AND TABLES FOR RFI/RI/BRA REPORT

CHAPTER 1 - FIGURES AND TABLES

Required Figures

- | | |
|------------------|--|
| Fig 1.3-1 | SRS Site Map Showing Unit Location |
| Fig 1.3-2 | Close Up Map of Unit |
| Fig 1.3-3 | Aerial Photograph of Unit |
| Fig 1.3-4 | IOU with all OUs identified and OU under investigation highlighted. |

Required Tables

- | | |
|--------------------|---|
| Table 1.2-1 | Savannah River Site Natural Resource Trustees and Their Responsibilities |
| Table 1.3-1 | History of Environmental Activities Performed at the Unit |
-

CHAPTER 2 - FIGURES AND TABLES

Required Figures

- | | |
|------------------|--|
| Fig 2.1-1 | Conceptual Site Model |
| Fig 2.3-X | Map(s) Depicting Investigation Activities/Locations |

Required Tables

None.

CHAPTER 3 - FIGURES AND TABLES

Required Figures

- Fig. 3.3-1** IOU with OUs, potentiometric surface, groundwater flow directions, and all known plumes identified.
- Fig. 3.5.1-1** Lithographic Nomenclature Used At SRS
- Fig. 3.5.2-1** Unit-Specific Geologic Section
- Fig 3.6.1-1** Comparison of Lithographic and Hydrologic Nomenclatures
- Fig. 3.6.2-1** Unit-Specific Hydrogeologic Section
- Fig 3.7.2-1** Proposed SRS Future Land Use
-

CHAPTER 4 - FIGURES AND TABLES

Required Figures

- Figure 4.2.1** Schematic Summary of Exposure Media Nomenclature
- Fig 4.2.X** Planar Maps and Vertical Cross-sections Showing Concentrations of all preliminary COCs and any other constituents or parameters that may aid in the interpretation of the operable unit data.

Required Tables

Tables 4.2.1.X Unit-Source Data *(at a minimum to include the headers below):*

Constituent	Frequency of Detects	Method Detection Limit	Range of Method Detection Limit	Maximum	Minimum	Average	Two Times Average Bkgd*	USC (Y/N)*
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* The last two columns are only used for those data groups that are evaluated for USC determination (e.g., 0-X soils, sediments, surface water, each aquifer, others as appropriate). The last two columns may be omitted if not applicable for a specific data group.

Table 4.2.1.1 Constituents Detected in 0-1 Soils
Table 4.2.1.2 Constituents Detected in 0-4 Soils
Table 4.2.1.3 Constituents Detected in 0-X Soils
Table 4.2.1.4 Constituents Detected in Sediments
Table 4.2.1.5 Constituents Detected in Surface Waters
Table 4.2.1.6 Constituents Detected in Water Table Aquifer
Table 4.2.1.7+x Constituents Detected in each additional aquifer

Tables 4.3.1.X Unit-Background Data (at a minimum to include the headers below):

Constituent	Frequency of Detects	Method Detection Limit	Range of Method Detection Limit	Maximum	Minimum	Average	Two Times Average
-------------	----------------------	------------------------	---------------------------------	---------	---------	---------	-------------------

Table 4.3.1.1 Constituents Detected in 0-1 Soils
Table 4.3.1.2 Constituents Detected in 0-4 Soils
Table 4.3.1.3 Constituents Detected in 0-X Soils
Table 4.3.1.4 Constituents Detected in Sediments
Table 4.3.1.5 Constituents Detected in Surface Waters
Table 4.3.1.6 Constituents Detected in Water Table Aquifer
Table 4.3.1.7+x Constituents Detected in each additional aquifer.

Tables 4.5.X Preliminary ARAR COCs

Prepare using the instructions in the established protocol. The table will include the following headings, at a minimum.

Constituent	Frequency of Detects	Method Detection Limit	Range of Method Detection Limit	Maximum	Minimum	Average	ARAR	ARAR COC
-------------	----------------------	------------------------	---------------------------------	---------	---------	---------	------	----------

Table 4.5.1 Soil ARAR COCs
Table 4.5.2 Sediment ARAR COCs
Table 4.5.3 Surface Water ARAR COCs
Table 4.5.4 Water Table Aquifer ARAR COCs
Table 4.5.5 Each Additional Aquifer ARAR COCs

Table 4.7.2-X PTSM Evaluation – Toxicity Aspect

Prepare using the instructions in the established protocol. The table will include the following headings, at a minimum.

USC	Maximum Concentrations			Noncarcinogens			Carcinogens		
	Exposure Group X	Exposure Group X	OU (Unit Max)	PTSM Criteria	PTSM Criteria Source	Index	PTSM Criteria	PTSM Criteria Source	Index
Total Noncarcinogenic Index (value) PTSM (Y/N)						(value) (Y/N)	Total Carcinogenic Index (value) PTSM (Y/N)		

Table 4.7.2-X PTSM Evaluation – Mobility Aspect

Prepare using the instructions in the established protocol. The table will include the following headings, at a minimum.

Constituent	Predicted Time To Max Groundwater Concentration (years)	Index Concentration	PTSM Criteria	PTSM Source	Arrival Time < 10 years (Y/N)	Index Concentration > Criteria (Y/N)	Currently GW Contaminant (Y/N)	PTSM (Y/N)
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CHAPTER 5 - FIGURES AND TABLES

Table 5.1.X Unit-Source Exposure Group Data

(RAGS- Part D - Standard Table 3)

Prepare using the instructions in the established protocol. The table will include the following headings.

Detected Analyte	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier
------------------	-------	-----------------	------------------------	--------------------------------	-------------------

(continuation of headings from above)

EPC Units	Reasonable Maximum Exposure			Central Tendency		
	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale

Table 5.1.1 Values for 0-1' Soils

Table 5.1.2 Values for 0-4' Soils

Table 5.1.3 Values for 0-X' Soils

Table 5.1.4 Values for Sediments

Table 5.1.5 Values for Surface Waters

Table 5.1.6 Values for Water Table Aquifer*

Table 5.1.X Values for each additional Aquifer*

Table 5.2.X Unit-Background Exposure Group Data

Prepare using the instructions in the established protocol. The table will include the following headings.

Detected Analyte	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units
<i>(continuation of headings from above)</i>						
Reasonable Maximum Exposure			Central Tendency			
Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	

Table 5.2.1 Values for 0-1' Soils

Table 5.2.2 Values for 0-4' Soils

Table 5.2.3 Values for 0-X' Soils

Table 5.2.4 Values for Sediments

Table 5.2.5 Values for Surface Waters

*Table 5.2.6 Values for Water Table Aquifer**

*Table 5.2.x Values for each additional Aquifer**

** For aquifers, the average concentrations from the highly concentrated area of plumes will be utilized to calculate RMEs.*

CHAPTER 6 - FIGURES AND TABLES

Required Figures

Figure 6.2.1-1 Vadose Zone Contaminant Migration Conceptual Model

Figure 6.3.1-1 Hydrogeologic Conceptual Model

Figure 6.3.2-1 Calculated Hydraulic Head Distribution from Model

Figure 6.3.3-1 Results from Particle Tracking (if applicable)

Figure 6.3.4-x Modeled Plume Position at Applicable Intervals (may require several figures)

Required Tables

Table 6.1-1 Physical and Chemical Properties of Contaminants

Table 6.2.2-1 Contaminant Migration Constituents of Potential Concern – Tier 1

Prepare using the instructions in the established protocol. The table will include the following headings.

USC	Maximum Concentration	Kd	MCL/RBC/RBA	Henry's Law Constant H'	Standard SSL (S-SSL)	Average Source Depth ds	Mass Limit SSL (MLSSL)
<i>(continuation of headings from above)</i>							
Unit Specific SSL (USSSL) <i>(Greater of S-SSL & MLSSL)</i>			CM COPC <i>(If USC > USSSL, list by analyte name.)</i>				

Table 6.2.2-2 Contaminant Migration Constituents of Potential Concern – Tier 2

CM COPC	Maximum Concentration	Retardation Factor R	Time of Maximum Groundwater Concentration T _{max}	Calculated Groundwater Concentration C _w	MCL/RBC/RBA	CM COPC* <i>(If C_w > MCL/RBC/RBA & T_{max} < 1000 yrs, list by analyte name)</i>
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Table 6.2.3-1 Modeling Input and Assumptions

Table 6.2.4-1 Preliminary CM COCs

CHAPTER 7 - FIGURES AND TABLES

Required Figures

- Fig. 7.1.1-1** Flowchart Illustrating Human Health Risk Assessment Process
- Fig. 7.1.5-1** Pictorial Representation of Receptors and Exposure Scenarios
- Fig. 7.1.5-2** Conceptual Site Model (human health receptors only)
- Fig. 7.2.1-1** Flowchart of the Human Health COPC Selection Process

Required Tables

Table 7.1.5-1 Selection of Exposure Pathways

(RAGS- Part D - Standard Table 1)

Scenario Time frame	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site / Off-Site
(continuation of headings from above)							
Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway						

Tables 7.2.2-X Occurrence, Distribution and Selection of Chemicals of Potential Concern (Human Health)

(RAGS- Part D - Standard Table 2.1)

The table will include the following:

INFO BOX:

Scenario Time frame: xxxxxxxx
Medium: xxxxxxxx
Exposure Medium: xxxxxxxx
Exposure Point: xxxxxxxx

COLUMN HEADINGS:

CAS Number	Chemical	Minimum Concentration	Minimum Qualifier	Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration
(continuation of headings from above)							
Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Value	Potential ARAR/ TBC Value	COPC Flag	Rationale for Contaminant Deletion or Selection

Table 7.2.2-1 Unit-Source Surface Soil

Table 7.2.2-2 Unit-Source Subsurface Soil (if appropriate)

Table 7.2.2-3 Unit-Source Groundwater

Table 7.2.2-4 Unit-Source Surface Water

Table 7.2.2-5 Unit-Source Sediment

Table 7.2.2-6 Unit-Background Surface Soil

Table 7.2.2-7 Unit-Background Subsurface Soil (if appropriate)

Table 7.2.2-8 Unit-Background Groundwater

Table 7.2.2-9 Unit-Background Surface Water

Table 7.2.2-10 Unit-Background Sediment

Tables 7.2.4-X Summary of HH COPC Screening

The table will include the following headings.

Analyte	Exposure Unit X	Exposure Unit X	Exposure Unit X	Exposure Unit X
---------	-----------------	-----------------	-----------------	-----------------

Table 7.2.4-1 Surface Soil

Table 7.2.4-2 Subsurface Soil (if appropriate)

Table 7.2.4-3 Groundwater

Table 7.2.4-4 Surface Water

Table 7.2.4-5 Sediment

Table 7.3.2-1 Values Used For Daily Intake Calculations

(RAGS- Part D - Standard Table 4)

The table will include the following:

INFO BOX:

Scenario Time frame: xxxxxxxx
Medium: xxxxxxxx
Exposure Medium: xxxxxxxx
Exposure Point: xxxxxx
Receptor Population: xxxxxx
Receptor Age: xxxxxxxx

COLUMN HEADINGS:

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rational/Reference	CT Value
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(continuation of headings from above)

CT Rationale/Reference	Intake Equation / Model Name
------------------------	------------------------------

Table 7.4.1-1 Non-Cancer Toxicity Data--Oral / Dermal

(RAGS- Part D - Standard Table 5)

The table will include the following:

COLUMN HEADINGS:

Chemical of Potential Concern	Chronic / Subchronic	Oral RfD Value	Oral to Dermal Adjustment Factor	Adjusted Dermal RfD	Units	Primary Target Organ
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(continuation of headings from above)

Combined Uncertainty / Modifying Factors	Sources of RfD : Target Organ	Dates of RfD: Target Organ
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Table 7.4.1-2 Non-Cancer Toxicity Data--Inhalation
(RAGS- Part D - Standard Table 5)

The table will include the following:

COLUMN HEADINGS:

Chemical of Potential Concern	Chronic / Subchronic	Value Inhalation RFC	Units	Adjusted Inhalation RfD	Units	Primary Target Organ
<i>(continuation of headings from above)</i>						
Combined Uncertainty / Modifying Factors	Sources of RfC:RfD : Target Organ	Dates				

Table 7.4.1-3 Non-Cancer Toxicity Data--Special Case Chemicals
(RAGS- Part D - Standard Table 5)

The table will include the following:

COLUMN HEADINGS:

Chemical of Potential Concern	Chronic / Subchronic	Value	Units	Primary Target Organ	Combined Uncertainty / Modifying Factors
<i>(continuation of headings from above)</i>					
Sources of Toxicity : Primary Target Organ	Date				

Table 7.4.1-4 Cancer Toxicity Data--Oral / Dermal
(RAGS- Part D - Standard Table 6)

The table will include the following:

COLUMN HEADINGS:

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor	Adjusted Dermal Cancer Slope Factor	Units
<i>(continuation of headings from above)</i>				
Weight of Evidence / Cancer Guideline Description	Source	Date		

Table 7.4.1-5 Cancer Toxicity Data--Inhalation
(RAGS- Part D - Standard Table 6)

The table will include the following:

COLUMN HEADINGS:

Chemical of Potential Concern	Unit Risk	Units	Adjustment	Inhalation Cancer Slope Fact	Units
<i>(continuation of headings from above)</i>					
Weight of Evidence / Cancer Guideline Description	Source	Date			

Table 7.4.1-6 Cancer Toxicity Data--Special Case Chemicals
(RAGS- Part D - Standard Table 6.3)

The table will include the following:

COLUMN HEADINGS:

Chemical of Potential Concern	Value	Units	Source	Date
-------------------------------	-------	-------	--------	------

Tables 7.6.1-X Summary of Receptor Risks and Hazards for COPCs
(RAGS- Part D - Standard Table 9)

The table will include the following:

INFO BOX:

Scenario Time frame: xxxxxxx
Receptor Population: xxxxxx
Receptor Age: xxxxxxx

COLUMN HEADINGS:

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
<i>(continuation of headings from above)</i>							
Chemical	Non-Carcinogenic Hazard Quotient						
	Ingestion	Inhalation	Dermal	Exposure Routes Total			

Tables 7.6.2-X Risk Assessment Summary
(RAGS- Part D - Standard Table 10)

The table will include the following:

INFO BOX:

Scenario Time frame: xxxxxxxx
Receptor Population: xxxxxxxx
Receptor Age: xxxxxxxx

COLUMN HEADINGS:

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total

(continuation of headings from above)

Chemical	Non-Carcinogenic Hazard Quotient			
	Ingestion	Inhalation	Dermal	Exposure Routes Total

CHAPTER 8 - ECOLOGICAL BASELINE RISK ASSESSMENT: FIGURES AND TABLES

This section has been removed. For BRAs see Reference ERD-AG-003 Part I, RCRA/CERCLA Document Format, F-14 Ecological Risk Assessment Process Annotated Outline for the ecological risk assessment format.

CHAPTER 9 - FIGURES AND TABLES

Required Figures

Figure 9.1-1. Revised Conceptual Site Model

Required Tables

Table 9.1.1-1 *Refined* ARAR COCs

Table 9.1.2-1 *Refined* CM COCs

Table 9.1.3-1 *Refined* HH COCs

Table 9.1.4-1 *Refined* ECO COCs

CHAPTER 10 - FIGURES AND TABLES

Required Figures

Figure 10.2.1-1 ARAR RGO Exceedences

Figure 10.2.2-1 CM RGO Exceedences

Figure 10.2.3-1 HH RGO Exceedences

Figure 10.2.4-1 ECO RGO Exceedences

Required Tables

Table 10.2.1-1 ARAR RGOs

Table 10.2.2-1 CM RGOs

Table 10.2.3-1 HH RGOs

Table 10.2.4-1 ECO RGOs

Table 10.2.5-1 Summary of Media RGOs

CHAPTER 11 - FIGURES AND TABLES

Required Figures

Figures 11.7.2-X **Figure(s) Depicting Impacted Media of Concern with RGO Contour or Equivalent Concentrations Highlighted.**

Figure 11.11-X **Simplified CSM and Refined COCs**

Required Tables

Table 11.1-X Overview of the COC Process

Table 11.7.1-1 Summary of Refined COCs and RGOs

CHAPTER 12 - FIGURES AND TABLES

As needed, none required.

APPENDIX A – PROTOCOL MATRIX

Table A-1. Protocol Matrix

APPENDIX E – CONTAMINANT MIGRATION MODELING

Table E. X Modeling Input and Assumptions

APPENDIX F – TOXICOLOGICAL PROFILES

Table F-1. Toxicological Profiles

APPENDIX G – Reserved for use, if needed

APPENDIX H – Human Health Risk Calculations – Non-Cancer Hazard, RME

Required Tables -

TABLE H-XXX.XXX.XXX Calculation of Non-Cancer Hazards

(RAGS- Part D - Standard Table 7)

The table will include the following:

INFO BOX:

Scenario Time frame: xxxxxxxx
Medium: xxxxxxxx
Exposure Medium: xxxxxxxxx
Exposure Point: xxxxxx
Receptor Population: xxxxx
Receptor Age: xxxxx

COLUMN HEADINGS:

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation
----------------	-------------------------------	------------------	------------------	-----------------	-----------------	-------------------------------------

(continuation of headings from above)

Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
---------------------	---------------------------	----------------	----------------------	-------------------------	-------------------------------	-----------------

Table H -Unit-Source RME – SRS Worker
Table H -Unit-Source RME – Industrial Worker
Table H -Unit-Source RME – Adult Resident
Table H -Unit-Source RME – Child Resident
Table H -Unit-Source RME – other receptors as appropriate

APPENDIX I – Human Health Risk Calculations – Cancer Risk, RME

TABLE I-XXX.XXX.XXX Calculation of Cancer Risk
(RAGS- Part D - Standard Table 8)

The table will include the following:

INFO BOX:

Scenario Time frame: xxxxxxxx
Medium: xxxxxxxx
Exposure Medium: xxxxxxxx
Exposure Point: xxxxxx
Receptor Population: xxxxx
Receptor Age: xxxxx

COLUMN HEADINGS:

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation
----------------	-------------------------------	------------------	------------------	-----------------	-----------------	-----------------------------------

(continuation of headings from above)

Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
-----------------	-----------------------	---------------------	---------------------------	-------------

Table I -Unit-Source RME – SRS Worker
Table I -Unit-Source RME – Industrial Worker
Table I -Unit-Source RME – Adult/Child Resident
Table I -Unit-Source RME – other receptors as appropriate

APPENDIX J – Human Health Risk Calculations – Radionuclide Dose, RME

Required Figures - None.

Required Tables -

TABLE J-XXX.XXX.XXX Calculation of Radionuclide Dose

The table will include the following:

INFO BOX:

Scenario Time frame: xxxxxxxx
Medium: xxxxxxxx
Exposure Medium: xxxxxxxx
Exposure Point: xxxxxx
Receptor Population: xxxxx
Receptor Age: xxxxx

COLUMN HEADINGS:

Exposure Route	Radionuclide	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Dose Calculation
<i>(continuation of headings from above)</i>						
Dose Conversion Factor	Dose					

Table J -Unit-Source RME – SRS Worker

Table J -Unit-Source RME – Industrial Worker

Table J -Unit-Source RME – Adult/Child Resident

Table J -Unit-Source RME – other receptors as appropriate

APPENDIX K – Human Health Risk Calculations – Non-Cancer Hazard, CT

Required Figures - None.

Required Tables -

TABLE K-XXX.XXX.XXX Calculation of Non-Cancer Hazards
(RAGS- Part D - Standard Table 7)

The table will include the following:

INFO BOX:

Scenario Time frame: xxxxxxxx
Medium: xxxxxxxx
Exposure Medium: xxxxxxxx
Exposure Point: xxxxxx
Receptor Population: xxxxxx
Receptor Age: xxxxxx

COLUMN HEADINGS:

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation
----------------	-------------------------------	------------------	------------------	-----------------	-----------------	-------------------------------------

(continuation of headings from above)

Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
---------------------	---------------------------	----------------	----------------------	-------------------------	-------------------------------	-----------------

Table K -Unit-Source RME – SRS Worker

Table K -Unit-Source RME – Industrial Worker

Table K -Unit-Source RME – Adult Resident

Table K - Unit-Source RME – Child Resident

Table K -Unit-Source RME – other receptors as appropriate

APPENDIX L – Human Health Risk Calculations – Cancer Risk, CT

Required Figures - None.

Required Tables -

TABLE L-XXX.XXX.XXX Calculation of Cancer Risk (RAGS- Part D - Standard Table 8)

The table will include the following:

INFO BOX:

Scenario Time frame: xxxxxxxx
Medium: xxxxxxxx
Exposure Medium: xxxxxxxx
Exposure Point: xxxxxx
Receptor Population: xxxxxx
Receptor Age: xxxxx

COLUMN HEADINGS:

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation
----------------	-------------------------------	------------------	------------------	-----------------	-----------------	-----------------------------------

(continuation of headings from above)

Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
-----------------	-----------------------	---------------------	---------------------------	-------------

Table L -Unit-Source RME – SRS Worker

Table L -Unit-Source RME – Industrial Worker

Table L -Unit-Source RME – Adult/Child Resident

Table L - Unit-Source RME – Child Resident

APPENDIX M – Human Health Risk Calculations – Radionuclide Dose, CT

Required Figures - None.

Required Tables -

TABLE M-XXX.XXX.XXX Calculation of Radionuclide Dose

The table will include the following:

INFO BOX:

Scenario Time frame: xxxxxxxx
Medium: xxxxxxxx
Exposure Medium: xxxxxxxx
Exposure Point: xxxxxx
Receptor Population: xxxxx
Receptor Age: xxxxx

COLUMN HEADINGS:

Exposure Route	Radionuclide	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Dose Calculation
(continuation of headings from above)						
Dose Conversion Factor	Dose					

Table M -Unit-Source RME – SRS Worker

Table M -Unit-Source RME – Industrial Worker

Table M -Unit-Source RME – Adult/Child Resident

Table M -Unit-Source RME – other receptors as appropriate

APPENDIX S. NATURAL INJURY RESOURCE EVALUATION

Table S.1 Natural Resource Trustee Responsibility List

Table S.2 Natural Resource Injury Checklist